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RE: Natural Occurring Asbestos – El Dorado Hills, California

In October 2004, the U.S. Environmental Protection Agency (EPA) Region 9 conducted a series of tests in and around El Dorado Hills (EDH), California, to assess the potential exposure of residents to naturally occurring asbestos (NOA). EPA released a report of its results to the general public in May 2005 [El Dorado Hills Naturally Occurring Asbestos Multimedia Exposure Assessment El Dorado Hills, California: Preliminary Assessment and Site Inspection Report – Interim Final]. At the request of the National Stone, Sand & Gravel Association (NSSGA), RJ Lee Group, Inc. (RJLG) conducted a review of EPA's May 2005 report and underlying data and issued a report (dated November 2005) entitled "Evaluation of EPA's Analytical Data from the El Dorado Hills Asbestos Evaluation Project". EPA Region 9 issued a letter (Meer) dated March 9, 2006 to RJLG and NSSGA requesting the submission of supporting documentation to RJLG's November 2005 report. On April 20, 2006, EPA Region 9 issued a report entitled "Response to the November 2005 National Stone, Sand & Gravel Association Report Prepared by the R.J. Lee Group Inc [sic] 'Evaluation of EPA's Analytical Data from the El Dorado Hills Asbestos Evaluation Project'" (Region 9 April 20 Response). In addition to the sequence of reports listed above, Mr. Gregory Meeker, USGS and a consultant to the EPA, in an undated letter, prepared a "Response to Questions Submitted by Dr. Vicki Barber, Superintendent of Schools, El Dorado County, California regarding Asbestiform Amphiboles" (Meeker Response). Dr. Barber's questions were submitted to Dr. Robert Virta, USGS, in an email dated February 1, 2006.

Upon review of the Region 9 April 20 Response, RJLG concluded there are a number of important differences of opinion as well as factual misstatements in the Region 9 Response that RJLG must address to ensure an accurate public record. To avoid unnecessary reiteration and to ensure that EPA's statements are kept in context, RJLG's responses are provided in the form of annotated comments within the Region 9 April 20 Response (Exhibit A). Similarly, RJLG has provided comments to the Meeker Response (Exhibit B). RJLG's response to EPA's March 9

letter is included in Exhibit C.

The major issues are summarized below.

There are serious data quality problems with the data from EPA's contract laboratories (i.e., Lab/Cor and Asbestos TEM Laboratory) that require a complete review and revision prior to using the data for a risk evaluation. Although EPA has continued to insist that they have followed carefully prescribed procedures for assuring data quality so that there could be no problem, RJLG's findings, also recently confirmed in two independent analyses conducted by Dr. D. Wayne Berman (on quality issues) and Mr. John Addison (on mineralogy and quality issues), indicate that the EPA's analytical results display serious data quality problems. Problems with the data include (1) the findings of the Asbestos TEM Laboratory of actinolite asbestos in the soil samples cannot be confirmed; (2) Lab/Cor failed to properly follow the ISO 10312 analytical method; (3) replicate/duplicate analyses demonstrate a lack of consistency in fiber measurements; and (4) selected area electron diffraction pattern (SAED) analysis and mineral identification by energy dispersive X-ray analysis (EDXA) show serious inaccuracies including measurement errors and systematic bias.

Irrespective of one's views regarding data interpretation or the general issues regarding asbestos and health effects in El Dorado Hills, any data used to evaluate such issues must be such that it can be reproduced in basic quality control tests (i.e., there must be reproducible counts when counting the same particle at the same location on the filter). Absent reproducibility, the data cannot be considered reliable, and it is impossible to develop or implement responsible and scientifically valid policies to address asbestos exposures or risks.

EPA Region 9 expanded the definition of "asbestos" to include all elongated mineral particles as asbestos. Region 9's analytical approach in the El Dorado Hills Study was based on counting any amphibole and serpentine particles as asbestos during TEM analyses that are longer than 5 μm and that have an aspect ratio ≥ 3:1 without consideration of whether the particle was actually asbestos or not. Lab/Cor expanded the mineralogical definition of asbestos by including particles that, at a minimum, do not have parallel sides. This modification of the analytical method, in particular the ISO 10312 procedure, is inconsistent with the geological/mineralogical definition of asbestos, and in the NOA context, results in significantly inaccurate estimates of asbestos exposure. Thus, the ISO 10312 method is an improper methodology for estimating health risks from NOA. The consequence of EPA Region 9's broadening of the definition of asbestos to include rock fragments of amphiboles and serpentine is that over 30% of the continental United States will be subject to a designation of being "asbestos" contaminated.

Based on more than thirty years of experience in developing methods for the analysis of asbestos, as well as a thorough knowledge of the most relevant and up-to-date mineralogical and epidemiological literature, RJLG has concluded that the geological and mineralogical

distinctions between asbestos and nonasbestos amphiboles and serpentines are critically important in defining and assessing exposures to asbestos, particularly exposures to NOA, which is found in an unprocessed natural state. Basing NOA exposure estimates on a tally of all elongated particles that are at least 5 μm long, whether or not the particles are asbestos, results in invalid estimates of NOA exposure that do nothing to improve the protection of public health.

Tremolite/actinolite asbestos show parallel extinction, not oblique extinction, in the polarized light microscope. Region 9 continues to state that actinolite asbestos was found in virtually all soil samples. Region 9 and Mr. Meeker compare the oblique extinction angles of the tremolite/actinolite found in the NIST Standard Reference Material (SRM) 1867a with the oblique extinction angles reported by Asbestos TEM Laboratory for particles in the El Dorado Hills soil. Region 9 discounts the RJLG argument that oblique extinction angles are inconsistent with the properties of asbestos, and relies on Mr. Meeker's interpretation of the NIST SRM 1867a to suggest that the NIST SRM 1867a is a "gold standard" for the extinction angles of tremolite and actinolite asbestos. RJLG does not believe the NIST SRM 1867a should be viewed as certifying the extinction angles of asbestos. The optical properties listed in the NIST Certificate of Analysis[1] were measured on *"larger, single crystal fibers"*, not asbestos fibers (page 3 of the NIST certificate). The NIST certificate notes that only *"some portion of the standard is asbestiform"* and also states that *"the unique morphology of asbestos may alter the properties of tremolite, actinolite, and anthophyllite asbestos from those reported for the materials contained in this SRM, as described in Reference 4."* Therefore it is incorrect to suggest that asbestos fibers can exhibit oblique extinction just because some of the particles that are present in the NIST SRM 1867a exhibit oblique extinction.

Asbestiform tremolite collected from Harvard Way near the EPA test site and from other California locations have parallel extinction. RJLG has evaluated microscopically asbestiform particles, as described in SRM 1867a, from a naturally occurring asbestos vein at Harvard Way, some two hundred yards from one of the playgrounds tested in the El Dorado Hills Study. Nineteen out of twenty asbestiform fiber bundles, meeting three or more of the criteria for the asbestiform habit, had parallel extinction. Similar results were obtained for three other samples of naturally occurring tremolite asbestos from California, including SMR 1867a. The vast majority of particles meeting two or more of the criteria that are characteristic of asbestiform minerals had parallel extinction. It is extremely uncommon to observe a population of asbestos fibers without observing parallel extinction. Addison indicates that asbestiform particles in the UK standards have parallel extinction[2]. In contrast, both Asbestos TEM Laboratory and RJLG

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[1] National Institute of Standards and Technology, 2003. Certificate of Analysis; Standard Reference Material® 1867a, Uncommon Commercial Asbestos. Available: https://srmors.nist.gov/certificates/1867a.pdf?CFID=4653224&CFTOKEN=3b1dee8a6980cca6-F6F7B807-B6AE-6927-254940B41F0F309C&jsessionid=b4302e2788e7DBFE$A. Accessed May, 2006

[2] Addison (2006). "Comments on the Report Dated November 2005, by the RJ Lee Group of the 'Evaluation of EPA's Analytical Data from the El Dorado Hills Asbestos Evaluation Project' as presented by the EPA in the document 'El Dorado Hills, Naturally Occurring Asbestos Multimedia Exposure Assessment Preliminary Assessment and Site Inspection Report Interim Final", March 23, 2006.

reported that the amphiboles in El Dorado Hills soil have inclined extinction, and **neither laboratory found particles with the asbestiform morphological characteristics** as described in the NIST SRM 1867a. Thus, RJLG found no evidence to support Mr. Meeker's argument that naturally occurring asbestiform fibers may have different extinction angles or morphologies than asbestiform fibers in commercial asbestos.

Tremolite/actinolite mineral particles do not form as asbestos fibers when their crystals contain more than a very small amount of aluminum. Region 9 disagrees with RJLG's assertion that the aluminum content of the particles in the El Dorado Hills Study is too high to permit them to be asbestiform. Mr. Meeker does not disagree with RJLG assertions concerning the aluminum content, but suggests that there may be exceptions. RJLG evaluated the aluminum content of asbestiform particles from the asbestos sample collected at Harvard Way, and the two other amphibole asbestos samples from California. None had aluminum in excess of one percent. In contrast, 75 percent of the particles in the El Dorado Hills soil analyzed by RJLG, and the particles analyzed by Lab/Cor from the El Dorado air samples, had aluminum content in excess of one percent. Thus, it is unlikely that the particles exhibiting the elevated aluminum content reported by EPA belong to the asbestiform population that is common to the El Dorado Hills area.

The Lab/Cor amphibole particles had aspect ratios consistent with nonasbestos particles, not asbestos fibers. Neither Region 9 nor Mr. Meeker evaluated RJLG's finding that the length/width distribution and mean aspect ratio of the particles in the El Dorado Hills Study were not that of an asbestiform population. Region 9 simply discounted this conclusion. RJLG also found that Lab/Cor did not adhere to the ISO 10312 method requirement that particles must have parallel or substantially parallel sides to be included in the fiber count.

The vast majority of asbestos fibers and nonasbestos particles from the El Dorado Hills location are readily classified as either asbestos or nonasbestos. Region 9 suggested that it is 'virtually impossible' to distinguish the particles in the El Dorado Hills Study from asbestiform particles based on Mr. Meeker and other literature references. As a general matter, federal agencies, including the Agency for Toxic Substances and Disease Registry (ATSDR) and the Occupational Safety and Health Administration (OSHA), have long recognized that nonasbestos particles can be distinguished from asbestos fibers. Nevertheless, to evaluate EPA's assertions, RJLG recorded TEM and SEM images of asbestiform particles from RJLG's Harvard Way asbestiform sample and other asbestiform samples from California, as well as nearly two hundred elongate particles having an aspect ratio greater than 3:1 in soil samples from the El Dorado Hills Study. These photographs, attached to RJLG's Response to EPA's March 9 request (Exhibit C), demonstrate that while there may be circumstances where the ability to differentiate between asbestiform and nonasbestos particles may be difficult, the distinction is readily apparent in the vast majority of amphibole particles from the El Dorado Hills soil samples.

A national review of naturally occurring asbestos policy is essential. Region 9 conducted the October 2004 tests to evaluate possible exposure to asbestos that may occur due to the presence of asbestos in soils. There are documented data quality flaws in EPA's El Dorado Hills Study which Region 9 neither acknowledges nor refutes. EPA Region 9, Mr. Meeker, and their contract laboratories have a very different understanding of key issues and methods than does RJLG and numerous other scientists. The issues, highlighted by the El Dorado Hills Study, have a national impact and underscore the need for substantive clarifications of NOA policy at the national level. A target outcome of this review should include improved clarity in the definitions, methods, and risk analysis procedures used to evaluate the potential health effects of NOA. The National Voluntary Laboratory Accreditation Program (NVLAP) should be charged with conducting additional training of laboratory personnel, whose primary activity to date has been post-abatement analysis of commercial asbestos fibers and who are unfamiliar with the distinction between asbestiform and nonasbestos amphiboles and serpentines, before qualifying them to analyze samples from mixed mineral environments.

The Exhibits attached provide further clarification, detail and support with regard to RJLG's fundamental analytical differences with Region 9 as well as the data quality flaws in the El Dorado Hills Study, the inaccuracies in Region 9's April 20 Response (Exhibit A), the Meeker Response (Exhibit B) and the supporting documentation of RJLG's initial evaluation of EPA's El Dorado Hills Study (Exhibit C).

Respectfully submitted,

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President

copy: W. Ford, NSSGA
Wayne Nastri, Regional Administrator, USEPA Region 9
Dr. Gerald Hiatt, Senior Regional Toxicologist, USEPA Region 9

Enclosures: (listed on next page)

Enclosures:

Exhibit A: Response of RJ Lee Group to the EPA Region 9 "Response (dated April 20, 2006) to the November 2005 National Stone, Sand & Gravel Association Report Prepared by the R.J. Lee Group, Inc [sic] 'Evaluation of EPA's Analytical Data from the El Dorado Hills Asbestos Evaluation Project'".

Exhibit B: Response of RJ Lee Group to Mr. Meeker's Letter (undated) to Dr. Vicki Barber, El Dorado Hills School District.

Exhibit C: Response of RJ Lee Group to EPA Region 9 (Meer) March 9 2006 Letter